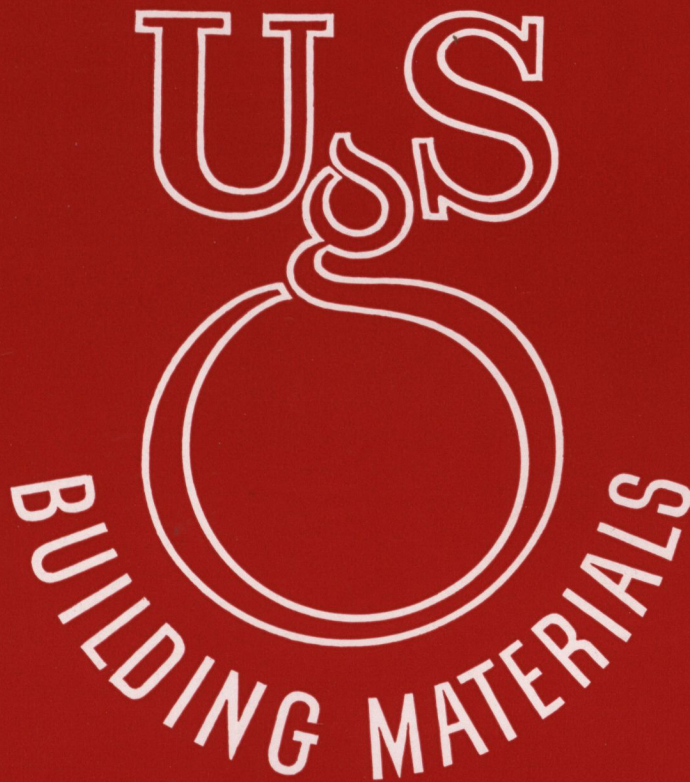


THE RED BOOK



1936 EDITION

UNITED STATES GYPSUM COMPANY

UNITED STATES GYPSUM COMPANY

Engineering Sales Division

• • •

GENERAL OFFICES

300 West Adams St., CHICAGO, ILL.

SALES OFFICES

Atlanta, Ga.....1440 Citizens and Southern Bank Building
Boston, Mass.....(At Mill) Mystic Wharf, Charlestown, Mass.
Buffalo, N. Y.....514 Brisbane Building
Cincinnati, Ohio.....503 Builders' Building
Cleveland, Ohio.....817 Hanna Building
Dallas, Texas.....1302 Santa Fe Building
Denver, Colo.....Continental Oil Building
Detroit, Mich.....(At Mill) River Rouge, Mich.
Indianapolis, Ind.....534 Architects' and Builders' Bldg.
Kansas City, Mo.....505-6-7 Fairfax Building

Los Angeles, Calif.....507 Architects Bldg., 5th St. at Figueroa
Milwaukee, Wis.....(At Mill) 439 W. Oregon St.
Minneapolis, Minn.....2510 Foshay Tower
New York City, N. Y.....30 Rockefeller Plaza
Omaha, Neb.....Woodmen of the World Building
Philadelphia, Pa.....(At Mill) 58th and Schuylkill River
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San Francisco, Calif.....2501 Harrison St.
Washington, D. C.....Investment Bldg., 15th and K St., N. W.

WHY FIREPROOF CONSTRUCTION—Because the long term cost is less.

Because, though steel is incombustible, it has little strength at high temperatures and will fail if not protected.

Because insurance cost is less.

WHY GYPSUM—Because gypsum is the best structural fireproofing material in general use (see General Technical Data on opposite page for proof of this statement).

WHY UNITED STATES GYPSUM COMPANY—Because the United States Gypsum Company has for a third of a century pioneered in the development of the many structural applications of gypsum, both

poured in place and precast, and maintained the leadership in this field.

Because the company has the most complete line and is therefore in position to recommend and sell the best type of construction for the particular job.

Because the company has twenty-eight plants serving the Engineering Sales Division located to speed delivery and reduce transportation costs.

Because the company maintains a staff of research and construction engineers specially schooled in the economics of structural design. Their services are available to architects without obligation of any sort.

Because the company maintains a complete erection organization. The employment of this service fixes the responsibility for both material and workmanship on the manufacturer who is most interested in satisfactory results.

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PRODUCTS DESCRIBED IN OTHER SECTIONS

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| (1) Plaster Bases, Plastering Systems, Plasters, Wallboards | (3) Thermal Insulation Products and Sound Control Service |
| (2) Built-up Roofing, Asphalt Shingles and Roll Roofing | (4) Expanded Metal Reinforcement, Partitions, Etc. |
| | (5) Paints |

Gypsum Constructions

ROOFS and FLOORS FIREPROOFING SPECIALTIES

WHY GYPSUM • GENERAL TECHNICAL DATA

FIREPROOF—Gypsum Tile alone have successfully passed the Underwriters' requirements for Fireproof Partitions.

FIRE PROTECTION—Steel loses strength rapidly at temperatures above 1000° F. and, unless properly protected, will fail at the temperatures of 1700° to 2300° F. frequently reached in a building fire.

The ideal fire protection material must:

- (1) Be incombustible
- (2) Protect the steel against high temperature
- (3) Not expand sufficiently to spall off and expose the steel

AND ABOVE ALL MUST:

- (4) Maintain these qualities for the duration of the fire.

GYPSUM COMPLIES WITH THE FOREGOING ESSENTIALS OF THE IDEAL FIREPROOFING MATERIAL BETTER THAN ANY OTHER COMMONLY USED MATERIAL.

PROOF—(1) Tests show that Gypsum will not support combustion at any known temperature.

(2) Tests show that it is impossible for gypsum-protected steel to reach higher temperatures than 212° F. until the gypsum has completely calcined; just as impossible as it would be to feel the heat of a blow torch through a piece of ice until after the ice had melted.

(3) Tests show that gypsum, possessing no strength after it has passed 212° in temperature, can only expand through 142° (room temperature to 212°) even when exposed to higher temperatures.

In a 10 ft. length of column fireproofing the total expansion

for gypsum is	.156 inches
for clay tile is	.59 inches
for concrete is	1.18 inches

(4) Maintaining these qualities when gypsum is used is simply a matter of thickness of the gypsum protection.

The Bureau of Standards' report (Technological Paper No. 130) says: "This table shows that the length of time required for a temperature of 600° C. (1112° F.) to be attained at a depth of 1½ in. does not vary greatly in the clay and concrete specimens. The gypsums are seen to be distinctly better than clay and concrete in this respect, only one of them (out of 28 total specimens) reaching a temperature of 600° C. at a depth of 1½ in. in the three and one-half hour test. Obviously, the gypsum specimens indicate distinctly superior thermal protection for embedded steel." During a test on 3-in. hollow partition tile at the Underwriters' Laboratories, a two-hour exposure to 1900° F. failed to raise the temperature of the unexposed side of the wall over 90° above room temperature.

OTHER DESIRABLE QUALITIES—In addition to these purely fire protection qualities, fireproofing materials must possess other desirable qualities such as:

- (1) Light weight—to save steel
- (2) Easy to cut and fit—to meet the wide variety of conditions which construction imposes
- (3) Good plaster base—as fireproofing is usually plastered.

GYPSUM COMPLIES WITH THESE DESIRABLE QUALITIES AS NO OTHER MATERIAL DOES.

LIGHT WEIGHT—The weight of gypsum constructions is very materially less than that of other commonly used materials. For example:

3 in. Hollow Pyrobar* Partition Tile weighs	10 lbs.
per square foot while	
3 in. Hollow clay partition tile weighs	15 lbs.
per square foot	
3 in. Solid Pyrobar Roof Tile weighs	17 lbs.
per square foot while	
3 in. Solid concrete weighs	38 lbs.
per square foot.	

In a typical structural steel frame building the substitution of gypsum fire protection for clay tile fire protection will show an average of 20 lbs. reduction

*Registered Trade-Mark

in the dead load per square foot of floor throughout the structure. If, in addition, gypsum floor construction is substituted for concrete or clay tile arch construction, an additional saving of approximately 30 lbs. per square foot of floor in dead load can be obtained, making a total saving of 50 lbs. per square foot.

ADAPTABLE—The many types of gypsum poured-in place and precast tile constructions for roofs and floors and the many special shapes and sizes of partition tile, shoe tile, angle tile, soffit tile, curb tile, gutter tile provide a type, size, and shape for all conditions.

Where cutting and fitting is necessary, Pyrobar Gypsum Tile may be cut almost as readily as wood.

PLASTER BASE—Gypsum bonds with gypsum. Therefore, gypsum is the ideal base for gypsum plaster which is universally used.

THERMAL INSULATION VALUE—Low heat conductivity is a fundamental characteristic of gypsum. The table in the opposite column contrasts the B.t.u. loss per hour, per square foot, per degree difference in temperature of several commonly used roof deck materials with the low loss through the equally common types of poured and precast gypsum constructions.

Corrugated sheet iron.....	1.50
3 in. stone concrete	.61
2½ in. Sheetrock Pyrofill Deck.....	.35
3 in. Sheetrock Pyrofill Deck.....	.32
2½ in. Weatherwood Pyrofill Deck (½ in. Weatherwood).....	.25
3 in. Weatherwood Pyrofill Deck (1 in. Weatherwood).....	.18
3 in. Solid Short Span Pyrobar.....	.41
4 in. Hollow Short Span Pyrobar.....	.35
5¼ in. Long Span Hollow Pyrobar.....	.29

SUMMARY OF GYPSUM ADVANTAGES—

- (1) Absolutely incombustible
- (2) Holds steel temperature to 212° F.
- (3) Does not expand sufficiently to spall
- (4) Maintains these qualities for hours
- (5) Very light weight
- (6) Easily cut and fitted
- (7) Good plaster base
- (8) Precast units machine moulded
- (9) Poured constructions set in 15 to 20 minutes
- (10) Easily and cheaply erected
- (11) Special shapes to fit all conditions
- (12) Meets all the essentials of the ideal fireproofing material whether poured or precast in units.

SHEETROCK* • PYROFILL* WEATHERWOOD* • PYROFILL ROOF CONSTRUCTIONS

• • • DESCRIPTION

SHEETROCK-PYROFILL ROOF CONSTRUCTION — Consists of Sheetrock undersurface in lengths equal to the main purlin spacing supported on the flanges of light rail sub-purlins, spaced 32½ inches on centers and clipped to the main purlins.

Over which is poured a slab of gypsum fibre concrete (Pyrofill) reinforced with an electrically welded galvanized steel fabric.

SHEETROCK UNDERSURFACE—Consists of ¾ in. Sheetrock, 32 in. wide, and in lengths equal to the main spacing so all joints occur over the main purlins.

WEATHERWOOD-PYROFILL ROOF CONSTRUCTION —Consists of Weatherwood Insulating Board undersurface (either ½ or 1 in. thick) in lengths equal to the main purlin spacing supported on the flange of light rail sub-purlins. Spaced 32½ in. on centers and clipped to the main purlins.

Over which is poured a slab of gypsum fibre concrete (Pyrofill) reinforced with an electrically welded galvanized steel fabric.

WEATHERWOOD UNDERSURFACE—Consists of either ½ or 1 in. thick Weatherwood Insulating Board, 32 in. wide, and in lengths equal to the main purlin spacing so all joints occur over the main purlins.

SUB-PURLINS—Light rails (or tees) laid at right angles to the main purlins, spaced approximately 32½ in. on centers and clipped to the main purlins.

REINFORCEMENT—Consists of a continuous electrically welded galvanized steel fabric (specially made to USG specifications) with No. 12 longitudinal wires 4 in. on centers and No. 14 transverse wire 8 in. on centers.

PYROFILL (GYPSUM FIBER CONCRETE)—Consists of gypsum stucco, water, and not to exceed 12½ lbs. of fiber to 87½ lbs. of calcined gypsum. It weighs only 55 lbs. per cubic foot.

CURBS, END WALLS, ETC.—Curbs, end and similar walls may be constructed of Precast Gypsum Tile. Curbs may also be constructed of Sheetrock-Pyrofill or Weatherwood-Pyrofill construction.

*Registered Trade-Mark

OUTSTANDING ADVANTAGES SHEETROCK • PYROFILL and WEATHERWOOD • PYROFILL ROOF CONSTRUCTIONS

ADAPTABILITY—Whenever steel framing is used (whether the roof be flat, 45° pitched, monitor, saw-tooth, Pond, Aiken, etc.), the inherent value of either Sheetrock-Pyrofill or Weatherwood-Pyrofill construction may be advantageously employed.

FIREPROOF—The inherent advantages of gypsum for fireproofing are universally recognized.

LIGHT WEIGHT—The Standard 2½ in. slab weighs only 12 lbs. as against 37 lbs. for 3 in. stone concrete. This saving is reflected throughout the structure, including columns and footings.

APPEARANCE—The flat undersurface with uniform paneled effect is singularly pleasing to the eye.

NOTE—If the underside of the slab is to be painted or otherwise decorated, such work should not be done until the waterproof roof covering has been applied and the slab is thoroughly dry.

ECONOMICAL—The simplicity of the construction plus the light weight and the speed with which it is installed makes either Sheetrock-Pyrofill or Weatherwood-Pyrofill Roof Construction extremely economical.

NO MAINTENANCE—Calcined gypsum is chemically inert. Examinations of steel rods embedded for fifteen years in gypsum have shown no evidence of progres-

sive corrosion. The maintenance cost is practically nothing.

HIGH INSULATION—Gypsum has the highest insulating value of any fireproof structural building material. It is effective in protecting the building from extremes of outside temperature, both in summer and in winter.

The following table gives the heat loss through various types of roof construction expressed in B.t.u.'s per hour, per sq. ft., per degree difference in temperature. All values are figured with a 5-ply roof covering:

2½ in. Sheetrock-Pyrofill	.35 B.t.u.'s
3 in. Sheetrock-Pyrofill	.32 B.t.u.'s
2½ in. Weatherwood-Pyrofill (½ in. board)	.25 B.t.u.'s
3 in. Weatherwood-Pyrofill (1 in. board)	.18 B.t.u.'s

SPECIAL ADVANTAGE OF WEATHERWOOD-PYROFILL ROOF CONSTRUCTION—Weatherwood-Pyrofill Roof Construction has the special, additional, and unique advantage of providing a high degree of acoustical absorption. This is particularly important in auditoriums, gymnasiums, and similar buildings but is also of considerable importance in many types of factories and industrial buildings.

The approximate acoustical absorption provided is given in the following table:

½ in. Weatherwood.....	30%
1 in. Weatherwood.....	45%

OTHER POURED • IN • PLACE GYPSUM CONSTRUCTIONS

USG TEE SYSTEM* PYROFILL ROOF CONSTRUCTION—This construction which was formerly called "The Mark's 'T' System" is quite similar to Sheetrock-Pyrofill and Weatherwood-Pyrofill constructions. The principal difference is that standard 32 x 36 in. plaster board or Weatherwood is used with 1 x 1 x ½ in. tee irons laid across the main tees to support the ends of the board. The construction details are identical.

USG IMBEDDED RAIL CONSTRUCTION—This construction is also similar to Sheetrock-Pyrofill construction in that the sub-purlins and mat reinforcing are the same. The big difference is that removable wood forms are used, hung three-quarters of an inch below the bottom flange of the sub-purlins. This provides a uniform gypsum undersurface unbroken by exposed sub-

purlins. This construction also permits the fireproofing of the main purlins with Pyrofill at low cost.

PYROFILL MONOLITHIC CONSTRUCTION—This is the oldest type of gypsum roof and floor construction in general use and for some buildings it is still the best. In this construction, twisted wire cables are stretched over the main purlins and then deflected in the center of each span and Pyrofill (gypsum fiber concrete) is poured on removable wood forms to desired thickness. In this construction the cables (figured by suspension formula) take the entire load and the gypsum acts merely as a filler.

On a large, flat roof when no exposed steel is allowed, this construction will be found very economical and satisfactory.



Sheetrock-Pyrofill Roof Construction—Pouring Pyrofill

*Trade-Mark

Master Specifications

SHEETROCK • PYROFILL and WEATHERWOOD • PYROFILL ROOF CONSTRUCTIONS

NOTE—Notes are explanatory or advisory only and should not be included in the specifications.

(1) WORK INCLUDED

NOTE—Here list the various roof areas to be constructed of Sheetrock-Pyrofill or Weatherwood-Pyrofill and specify the prescribed live load. If live loads vary, designate the live load applying to the various areas.

(2) SUPPORTING STRUCTURAL STEEL WORK

All steel work for the support of the Sheetrock-Pyrofill Roof Construction has been designed not only to carry the prescribed live and dead loads, but to accommodate the most economical installation in accordance with the standard detail of the United States Gypsum Company.

(3) MATERIALS

(3a) GENERAL—All Gypsum products shall be as manufactured by the United States Gypsum Company, 300 West Adams Street, Chicago, Ill.

(3b) SUBPURLINS—Subpurlins shall be steel [tees] [rails] of sizes and spacings required or indicated on the structural plans, furnished with a shop coat of paint. Provide all necessary clips [of types best suited to conditions] for rigidly securing subpurlins to main purlins, etc.

(3c) SHEETROCK FORMS—Sheetrock ($\frac{3}{8}$ in. thick x 32 in. wide) shall be mill-made to exact lengths (maximum 10 ft.) to match the main purlin centering.

(3d) WEATHERWOOD FORMS—Weatherwood [$\frac{1}{2}$ in.] [1 in.] thick x 32 in. wide shall be mill-made to exact lengths (maximum 10 ft.) to match the main purlin centering.

(3e) REINFORCEMENT—Steel reinforcement shall be galvanized electrically-welded steel fabric made to USG specifications consisting of No. 12 main longitudinal wires 4 in. on centers and No. 14 transverse wires 8 in. on centers having an effective sectional area of .026 sq. in. per foot width of slab.

(3f) PYROFILL—Pyrofill shall consist of calcined gypsum and not to exceed 12½ lb. of clean soft wood fiber to every 87½ lb. of

gypsum. The gypsum and wood fiber shall be mill mixed. Water for proper consistency shall be added at the job.

(3g) PRECAST CURB TILE—Where so indicated on plans and details furnish 3-in. thick precast gypsum curb tile (reinforced when carrying a roof load or retaining drainage fill). For end wall construction where so indicated furnish Pyrobar Curb Tile (3-in. x 15-in. x 30-in. non-reinforced).

(3h) GYPSUM MORTAR—Gypsum mortar shall consist of one part of unfibered gypsum cement plaster and not to exceed two parts of clean sharp sand.

(4) ERECTION

(4a) GENERAL—All [Sheetrock-Pyrofill] [Weatherwood-Pyrofill] Roof Construction including all subpurlins [curbs] [end walls] [saddles] [drainage fill] etc., shall be completely erected by the Engineering Sales Division of the United States Gypsum Company.

Roof construction shall be of thickness required on plans and details.

All joints in subpurlins shall be staggered or rigidly tied together. Reinforcement shall be continuous. All roof surfaces shall be screeded smooth and true ready to receive the finished waterproof roof covering.

(4b) POURED CURBS—All curbs so indicated on plans and details shall be constructed of Sheetrock-Pyrofill.

(4c) TILE CURBS—All curbs so indicated on plans and details shall be constructed of precast gypsum curb tile (reinforced when carrying roof load or retaining drainage fill) set in gypsum mortar.

(4d) END WALLS, ETC.—Construct all [end walls] of [monitors] [sawtooth skylights] ["A" frames] [specify] of Pyrobar Curb Tile set in gypsum mortar.

(4e) DRAINAGE FILL—Provide Pyrofill saddles and drainage pitches to direct roof drainage to [gutters] [drainage outlets].

(5) WATERPROOF ROOF COVERING

NOTE—Provide in the Roofing and Sheet Metal division of the specifications that the waterproof roof covering shall be applied as soon as possible after the Sheetrock-Pyrofill slab is erected (preferably within twenty days). See USG Built-up Roofing Section.

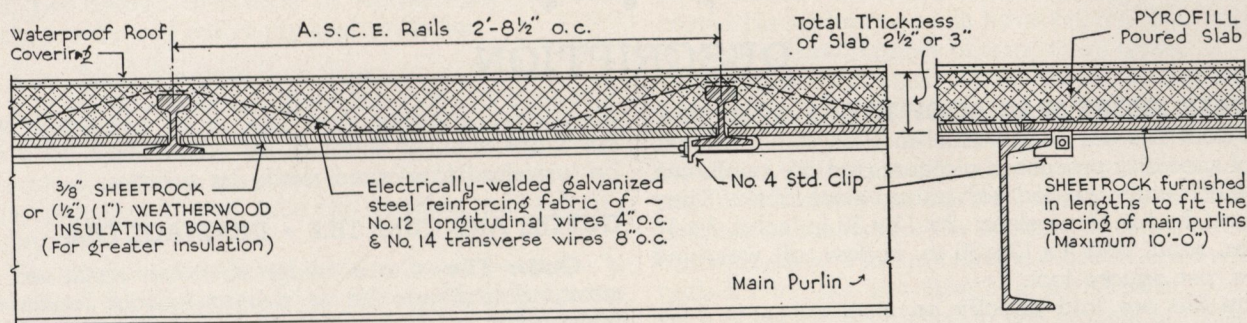
RAIL SIZES AND WEIGHTS OF SALES

Rails Spaced 32½ In.—45 Lb. per Sq. Ft. Total Load B.M. = $\frac{1}{10}$ WL; Fiber Stress, 18,000 Lb. Per Sq. In.

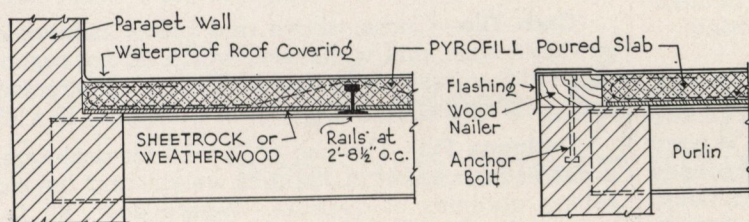
Span of main purlins	Size of rail, lb.	Weight of rail per sq. ft. of roof, lb.	*Minimum thickness of slab, in.	Weight of Slab including rail, lb.
Up to 6'4"	8	1.00	2½	11.50
6'4" to 8'11"	12	1.50	2½	12.00
8'11" to 11'3"	16	2.00	2½	12.50
11'3" to 13'2"	20	2.50	3	15.00

*Includes thickness of Sheetrock or Weatherwood. For other spacing of sub-purlins, or other loads, allowable span will vary inversely as the square root of the spacing or the load. Spans can be increased over those shown by considering the effect of the rail imbedment in the slab. Tests have shown that an 8-lb. rail may be used for spans up to 7 ft.

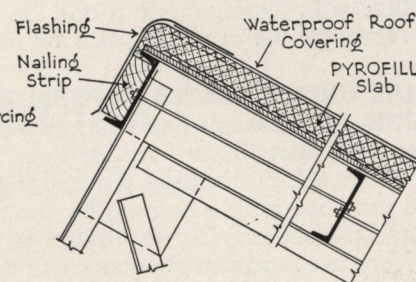
DETAILS OF SHEETROCK-PIROFILL SYSTEM



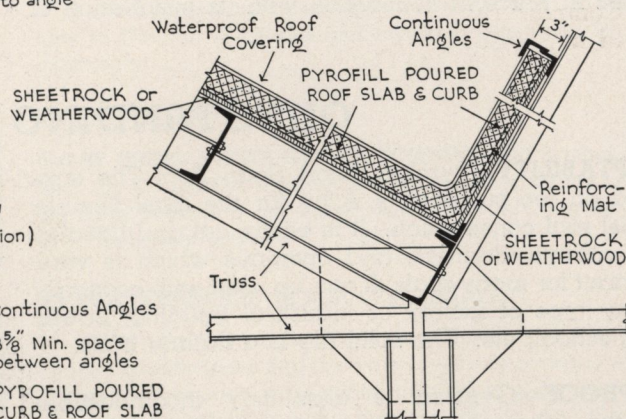
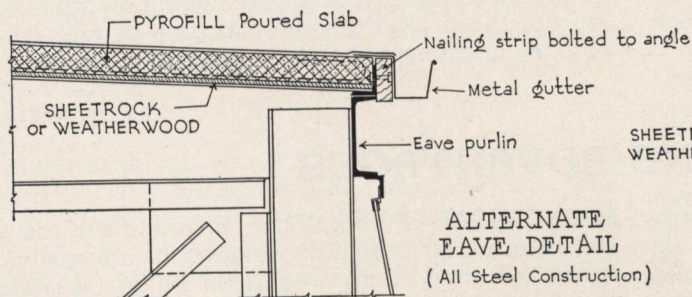
TYPICAL SHEETROCK-PIROFILL ROOF CONSTRUCTION



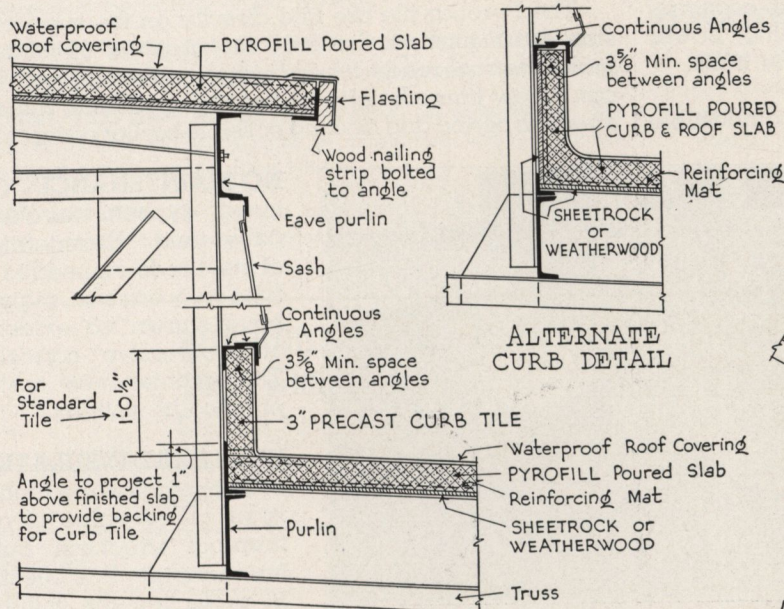
ALTERNATE DETAILS FOR ENDS OF BUILDING



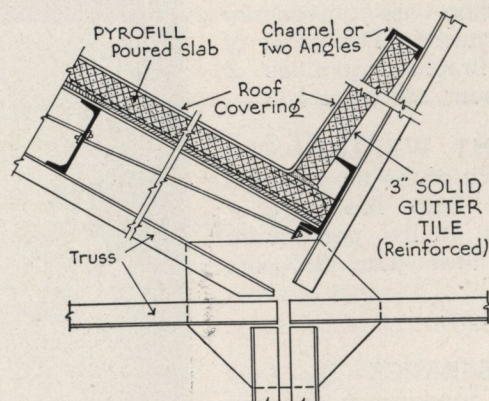
SAWTOOTH PEAK CONST'N.



SAWTOOTH GUTTER CONST'N.



CURB & EAVE CONSTRUCTION FOR MONITOR



ALTERNATE SAWTOOTH GUTTER CONSTRUCTION

PYROBAR SHORT SPAN ROOF TILE

DESCRIPTION

PYROBAR SHORT SPAN ROOF TILE—Pyrobar Short Span Roof Tile are cast in steel moulds using a dense mix of specially processed gypsum and are reinforced with electrically welded galvanized steel fabric. They are furnished in three sizes: 3 x 12 x 30 in. solid, 3 x 18 x 36 in. solid, and 4 x 12 x 30 in. hollow, all weighing 17 lbs. per square foot.

The tile are laid directly on steel supports without mortar and with sides tight together with full bearing on the sub-purlins. The grouting grooves are then filled with gypsum mortar and the roof is immediately ready for the application of the roof covering.

SPECIAL UNITED STATES GYPSUM BULB TEE SUB-PURLINS—This section has been developed primarily for use with Short Span Pyrobar Roof Tile as a more economical sub-purlin than standard tees. The wide flange provides ample bearing for the tile, and, being designed particularly for this purpose, it has considerably greater load carrying capacity than a standard tee of equal sectional area. The United States Gypsum Company is prepared to furnish the bulb tees, erected in place in connection with its installation of

Short Span Pyrobar Roof Tile, or in connection with the installation of Pyrobar by others, bulb tees can be furnished fabricated ready for erection.

GUTTER AND CURB TILE • DRAINAGE FILL—

Gutter Tile—Curbs under sawtooth sash, etc. restraining drainage fill or subject to roof loads, are constructed of 3-in. solid reinforced Pyrobar Gutter Tile, 12 in. wide and made in lengths to fit the structural steel work.

Curb Tile—Curbs, above and below monitor and sawtooth sash, end walls, etc., which do not sustain a roof load or restrain drainage fill are constructed of 3-in. solid non-reinforced Pyrobar Curb Tile, 15 x 30 in.

Drainage Fill—The use of Pyrofill for drainage fill is ideal on account of its light weight and the quick setting qualities of gypsum. Where deep fill is required, the Pyrofill is laid over dry cinders tamped in place. The Pyrofill provides a smooth surface for the roof covering and is an excellent material for constructing fillets and leveling off uneven and broken surfaces in connection with difficult roof framing.

OUTSTANDING ADVANTAGES

ADAPTABILITY—Pyrobar Short Span Roof Tile supported on tee sub-purlins is by far the most flexible precast roof construction. It is easily cut and fitted at hips, valleys, dormers, and openings which is very important for many roofs. It can be used with economy on any type of factory or industrial building, power plant, school, etc. The solid tile is a nailing base.

FIREPROOF—Gypsum is absolutely incombustible and the inherent advantages of gypsum for fireproofing are universally recognized. For proof of the fireproof qualities of gypsum, see page 1.

LIGHT WEIGHT—The weight of the tile plus the USG Bulb Tee is only about 18 lbs. per square foot (less than half the weight of 3 inches of stone concrete).

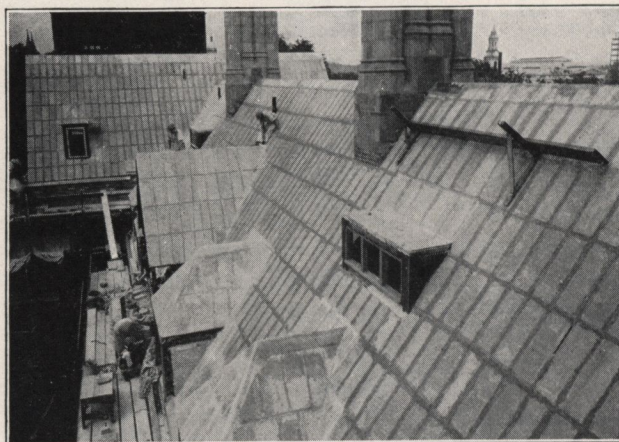
APPEARANCE—The interior appearance is neat and the unplastered surface is an excellent light reflector.

ECONOMICAL—Pyrobar Roof Tile are low in cost and permanent. The large light weight units are easily and speedily erected in any weather in which it is possible to work.

The Pyrobar tile are laid directly on the supporting steel work and require only the grouting of joints to make the roof ready for the waterproof covering. This can follow immediately, materially shortening the construction period and making possible earlier occupancy.

NO MAINTENANCE—Calcined gypsum is chemically inert. Examinations of steel rods embedded for fifteen years in gypsum have shown no evidence of progressive corrosion. The maintenance cost is practically nothing.

HIGH HEAT INSULATION—Gypsum has the highest insulating value of any fireproof structural building material. It is effective in protecting the building from extremes of outside temperature, both in summer and winter.



Bingham Hall, Yale University, New Haven, Conn.
W. B. Chambers, Architect
11,755 sq. ft. Short Span Pyrobar

HEAT TRANSMISSION VALUES—In the following the transmission is expressed in B.t.u.'s per hour, per square foot, per degree difference in temperature. All roof decks are figured with 5-ply roof covering.

3 in. Solid Pyrobar Roof Tile..... .41 B.t.u.'s
4 in. Hollow Pyrobar Roof Tile.... .35 B.t.u.'s

NAILING BASE—The 3 in. solid is recommended particularly for nailing purposes because it assures maximum penetration and thus the greatest nail-holding ability.

Application of ordinary slate or ornamental tile to roofs up to 60° slope should be made with nails having not less than 2 in. penetration. When the slope of the roof is greater than 60° or extra heavy slate or tile is to be used, refer the problem to the Company's

Engineers for special study and recommendations.

The roof deck should be thoroughly dry or as nearly so as can be reasonably obtained. Square cut cement coated Naval bronze nails have proven their superiority after a large number of tests on all types.

Application of sheet metal (tin or copper) requires thoroughly rigid fastening, due to the strain put upon the cleat nails by the expansion and contraction of the sheets. There should be sufficient cleats to securely anchor the sheets to the roof construction. Standard practice indicates that the spacing of cleats should be approximately 8 in. on centers, each secured with two nails having not less than 2 in. penetration.

It is standard practice to use a sheet of roofing felt between the gypsum roof deck and the ornamental covering, whether of slate, tile, or metal.

Master Specifications

PYROBAR SHORT SPAN ROOF TILE

(1) WORK INCLUDED

NOTE—Here list the various roof areas to be constructed of Pyrobar Precast Roof Tile and specify the prescribed live load. If more than one type of tile is used, list separately the areas constructed of each.

(2) MATERIALS

(2a) SHORT SPAN TILE—Where so designated, the roof slab shall be constructed of Pyrobar Short Span Roof Tile [3 x 12 x 30 in. Solid] [3 x 18 x 36 in. Solid] [4 x 12 x 30 in. Hollow] accurately laid, without mortar, upon the supporting steel with full bearing and with tile units laid tight. All joints on top surface shall be filled with gypsum mortar and the roof left smooth and true, ready for the application of the waterproof roof covering.

(2b) SPECIAL UNITED STATES GYPSUM BULB TEE SUB-PURLINS—All sub-purlins shall be special United States Gypsum Bulb Tees.

(2c) CURB TILE, END WALLS, ETC.—Where so indicated on the plans, curbs and end walls shall be constructed with 3 in. Solid Pyrobar Curb Tile set in gypsum mortar.

(2d) GYPSUM MORTAR—Gypsum mortar shall consist of one part of unfibred gypsum cement plaster and not to exceed two parts

of clean, sharp sand. Mix to the proper consistency in a clean mortar box with clean water.

(2e) SADDLES AND DRAINAGE FILL—Saddles and Drainage Fill shall be constructed of Pyrofill (Gypsum Fiber Concrete) consisting of calcined gypsum and not to exceed 12½ lbs. of clean soft wood fiber to 87½ lbs. of gypsum and sufficient clean water for proper consistency.

(3) ERECTION

(3a) BY UNITED STATES GYPSUM COMPANY—All Pyrobar Precast Roof Tile Construction shall be completely erected by the Engineering Sales Division of the United States Gypsum Company or one of its authorized erectors.

(4) WATERPROOF ROOF COVERING

NOTE—Provide in the Roofing and Sheet Metal division of the specifications that the waterproof roof covering shall be applied as soon as possible after the gypsum roof slab is erected (preferably within twenty days).

NOTE—For application of ornamental roofing, such as slate, tile, and metal, see recommendations given above under "Nailing Base".

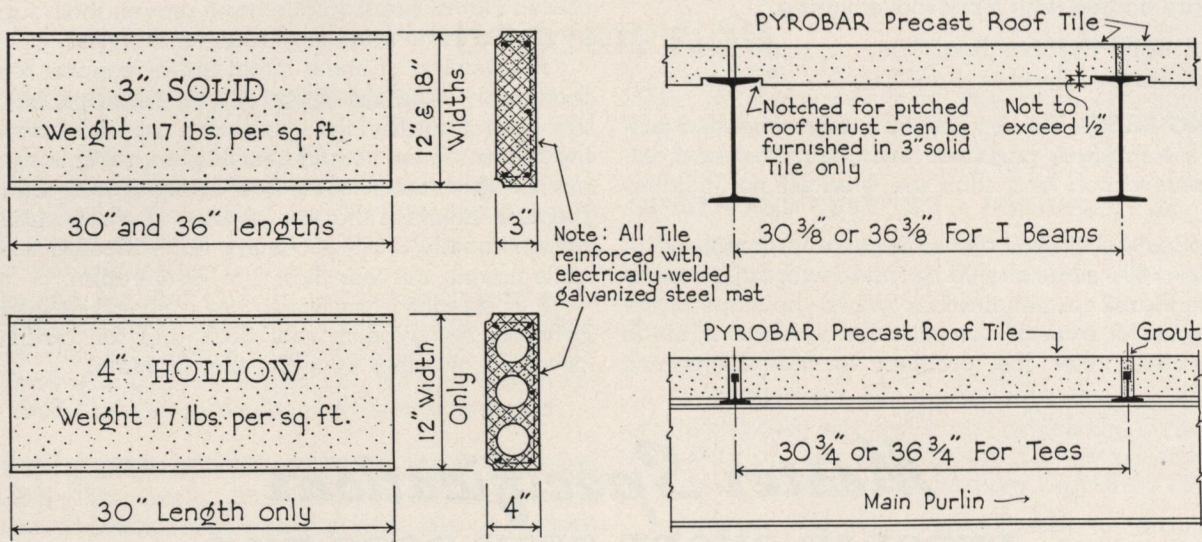
SUBPURLIN SIZES FOR PURLIN SPANS UP TO 8 FT. 5 IN.
Used with Short Span Tile, Solid and Hollow—18,000-lb. Stress
Spaced 30¾ In. on Centers—50 Lb. per Sq. Ft. Total Load—BM=¼ WL

Span	6' 1"	6' 11"	7' 9"	8' 5"
Size of tee	2¼ x 2¼—4.1 lb.	2¼ x 2¼—4.9 lb.	2½ x 2½—5.5 lb.	2½ x 2½—6.4 lb.

USG Bulb Tee—3.1 Lb—1.25 lb. Steel per sq. ft. of roof—Span to 7'-4" (6'-9" for 36¾" O.C.)

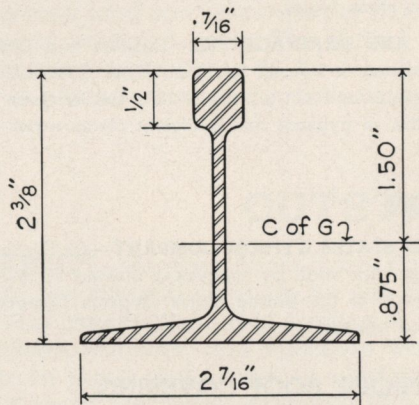
For other spacing of sub-purlins, or other loads, allowable span will vary inversely as the square root of the spacing or the load.

DETAILS OF PYROBAR SHORT SPAN ROOF TILE



U. S. G. BULB TEE SUB ~ PURLIN

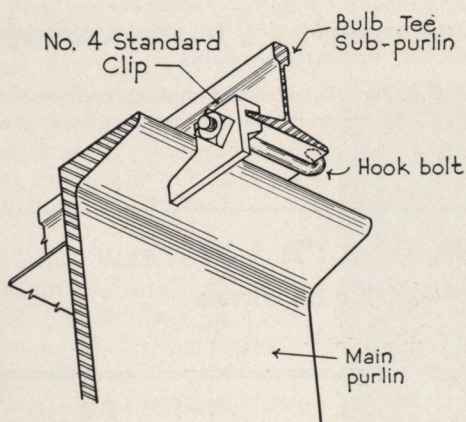
For Short Span Roof Tile



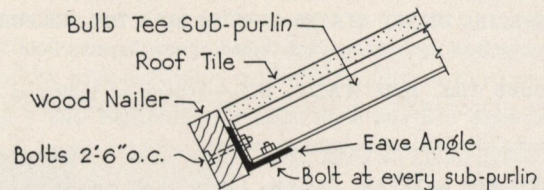
Weight Per Yard	8.10 lbs.
Section Modulus	.440 in. ³
Moment of Inertia	.660

Based on 2'-6 3/4" spacing of Tees
Total Roof Load of 50 lbs. per sq. ft.

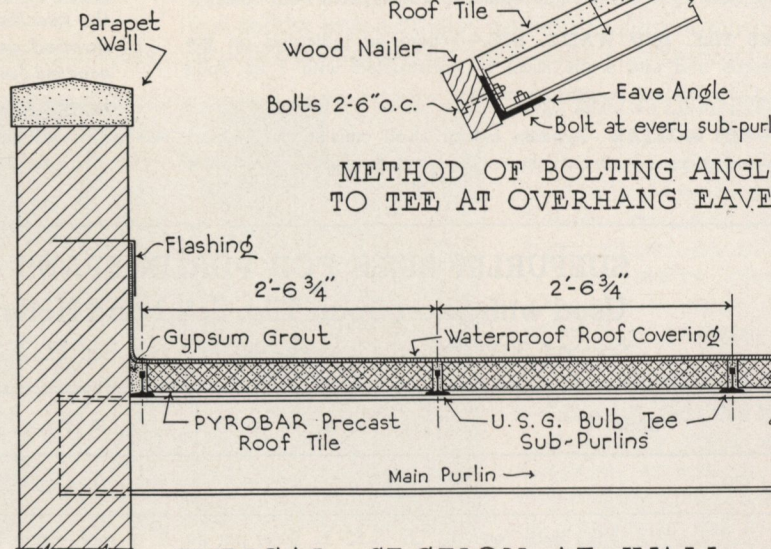
Maximum Span (fs = 16000, M = $\frac{WL}{10}$)	6'-9"
Deflection	.25
Maximum Span (fs = 18000, M = $\frac{WL}{10}$)	7'-2"
Deflection	.31



METHOD OF CLIPPING SUB-PURLINS TO MAIN PURLINS ~ SLOPED ROOF



METHOD OF BOLTING ANGLE TO TEE AT OVERHANG EAVES



TYPICAL SECTION AT WALL

PYROBAR LONG SPAN HOLLOW ROOF TILE

DESCRIPTION

GENERAL—Pyrobar Long Span Hollow Precast Roof Tile are cast in steel moulds using specially processed gypsum and are reinforced with electrically welded galvanized steel fabric. They are made 5¼ in. thick, 18 in. wide, and any length from 4 to 6½ feet to fit the purlin spacing on the job. They are made in either butt end or lap joint end for I-beam or channel purlins respectively, and can be furnished notched if required for roof thrust. The weight of this tile is 23 pounds per square foot.

Curb and Gutter Tile and Drainage Fill are the same as described on page 6.

OUTSTANDING ADVANTAGES—

- (1) **Fireproof**—See page 1.
- (2) **Light Weight**—See pages 1 and 2.
- (3) **Appearance**—The flat, even surface is extremely pleasing in appearance and provides a high light reflection coefficient.

ECONOMICAL—Pyrobar Roof Tile are low in cost and permanent. The large light-weight units are easily and speedily erected in any weather in which it is possible to work. The tile are laid directly on the supporting steel work and require only the grouting of joints to make the roof ready for the waterproof covering. This can follow immediately, materially shortening the construction period and making possible earlier occupancy. Maintenance cost is practically nothing.

HEAT INSULATION—Gypsum has the highest insulating value of any fireproof structural material. It is

equally effective in protecting the building from extremes of outside temperature, both in summer and in winter. Pyrobar Long Span Hollow Roof Tile has the very low transmission of .29 B.t.u.'s. For complete list, see page 2.

ADAPTABILITY—Long Span Hollow Pyrobar Roof Tile are primarily designed to provide a flat uniform ceiling with maximum light reflection and insulation. They are manufactured in lengths 4 ft. to 6 ft. 6 in. to suit the steel framing, and 5¼ in. deep. The tile can be notched to fit over the purlin flanges if desired and can be furnished either with or without lap joint, depending on the bearing afforded. Lap joint tile should be used whenever channel purlins are provided. Long Span Tile are not recommended for roofs with difficult framing requiring considerable cutting nor where a nailing deck is required.

PURLIN REQUIREMENTS—The tile are made to span from purlin to purlin (either steel or wood). No tees or other type of sub-purlins are required. The most economical purlin spacing is approximately 6 feet.

INSTALLATION—The tile are laid directly on the steel sub-purlins or wood framing with sides tight together. The grouting joints on the top surface are then filled with gypsum mortar and the roof is immediately ready for the application of the roof covering.

SPECIFICATIONS—The specifications for Pyrobar Short Span Roof Tile given on page 7 may be used by substituting "Long Span Hollow" for "Short Span."

METAL BOUND GYPSUM FLOOR and ROOF TILE

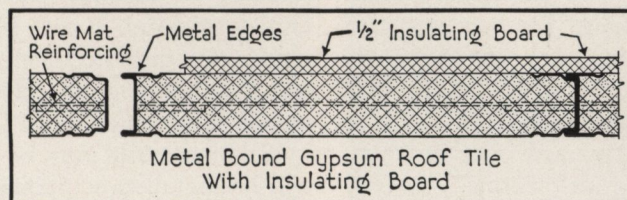
DESCRIPTION

GENERAL—This is a gypsum tile that uses a metal edging to overcome the reduction in strength resulting from its reduction in thickness (as compared with other USG decks). This metal edging is also depended upon to serve as a cantilever for ends of tile projecting beyond supporting joists. Its success depends upon the maintenance of a perfect bond between the metal edging and the gypsum. The units are 2 in. thick, 15 in. wide, and 10 ft. long.

LOADING—75 lbs. total safe load for floors, with a

clear span of 4 ft. between beams, and 50 lbs. total load on roofs, with a 6 ft. spacing of purlins.

ADVANTAGES—The construction is light weight (12 lbs. per square foot). No special sizes are required since the end joints need not fall over supports.



INSULATION—Since the metal edge extends through the tile tending to conduct heat, we recommend that ½ in. insulation board be used over the tile for roof construction.

PYROBAR PRECAST 2½ INCH THICK TONGUE and GROOVE FLOOR and ROOF TILE

• • •

DESCRIPTION

PURPOSE—To provide a precast, light weight, incombustible construction for floors or roofs in connection with Junior Beams, Bar Joists, and other Metal Joists.

GENERAL—2½-in. Tongue and Groove Tile are factory made in units 2½ in. x 10 in. x 6 ft. 0 in. with tongue and groove joints. They are made without any metal edge or any other exposed steel, being reinforced by an electrically welded mat embedded in the gypsum mass where it is protected from corrosion and other damage. This tile weighs 14 lbs. per square foot.

LOADING—For floor construction with supports spaced not over 30 in. O.C., 2½ Inch Tongue and Groove Tile

will safely support a load of 150 lbs. per square foot. For roof construction with supports spaced not over 4 ft. 0 in. O.C., 2½ Inch Tongue and Groove Tile will safely support a load of 50 lbs. per square foot.

ADVANTAGES—Light weight (14 lbs. per square foot), easy and speedy erection, embedded reinforcing, low heat conductivity without additional insulation, standard size (no special sizes), and all the advantages of precast units over poured in place construction from the standpoint of cleanliness and independence from freezing weather conditions.

This is our recommended type of Tongue and Groove Tile construction.

PYROBAR PRECAST CEILING TILE

• • •

DESCRIPTION

PURPOSE—To provide fire protection and a plaster base under any type of steel floor or roof construction.

GENERAL—Precast reinforced gypsum tile, 2 x 18 x 30 in. with fractional sizes as required for starting tile, closures, etc. All four edges have lapped joints. A ⅜-in. galvanized rod is embedded in each tile so that they may readily be attached to a supporting system of hot rolled plasterer's channels. The tile may be at-

tached directly to the steel or suspended from it. Girders may be fireproofed with Pyrobar beam and girder fireproofing.

ADVANTAGES—Especially indicated for the protection of light steel floor systems, they provide full fire protection and an economical plaster base in one material. Space for pipes and conduits is provided without resorting to heavy floor fills.

HYDROCAL* MASTIC FLOOR FINISH

• • •

DESCRIPTION

GENERAL—Hydrocal (Patented), a new specially processed gypsum cement of great strength, is utilized in place of Portland cement in this many purpose mastic floor mixture. Hydrocal is mixed with sand and emulsified asphalt in various proportions, depending upon the nature of the work to be done. For heavy traffic, crushed stone or gravel is added to the aggregate.

The mastic composition is poured like concrete and leveled off and finished in thicknesses from ½ in. to ¾ in. over the base. It may be used over gypsum, concrete, wood, or metal floor constructions.

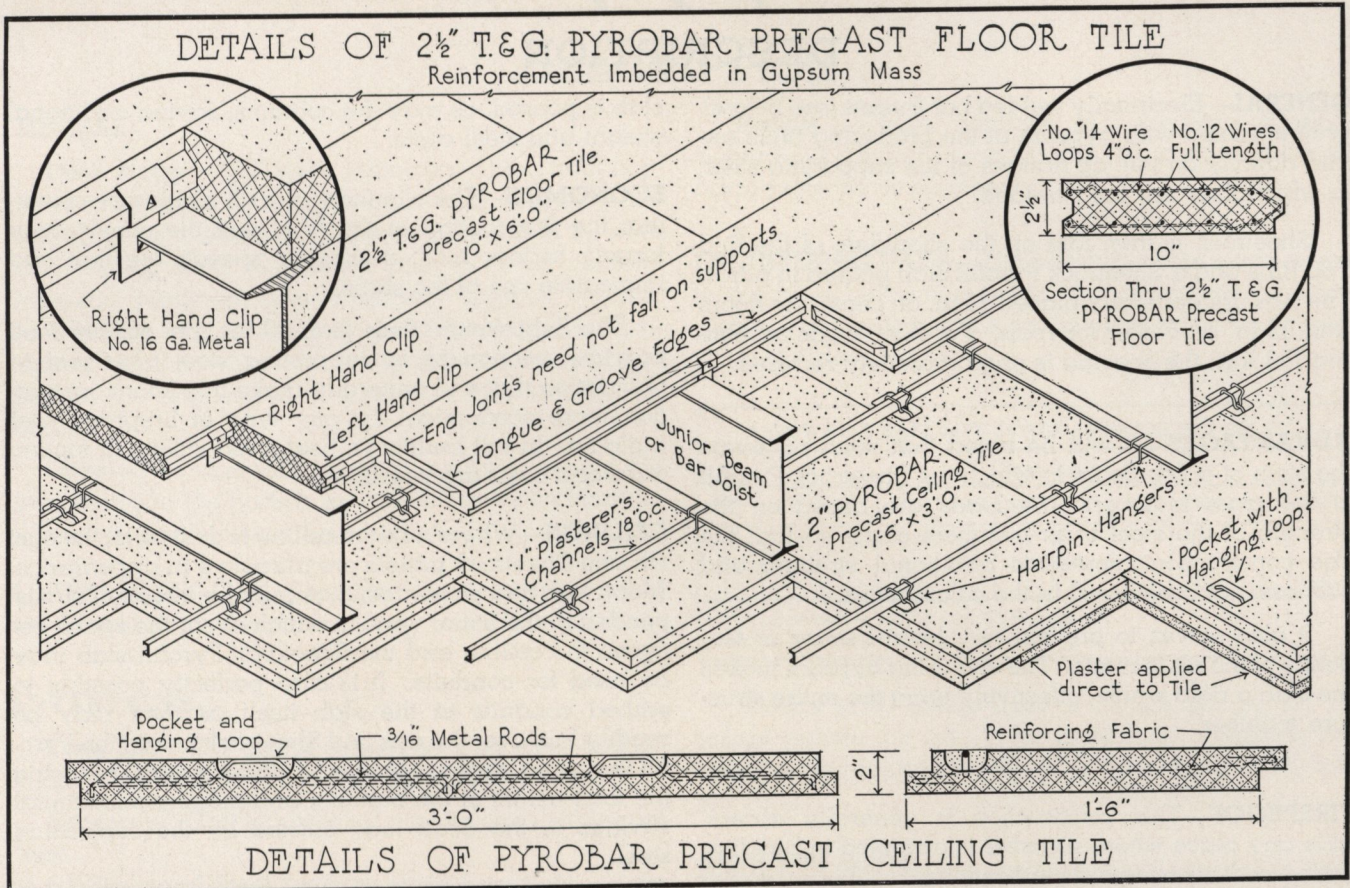
ADVANTAGES—Hydrocal requires less emulsified asphalt than does Portland cement in mixtures of this character, resulting in a lower cost.

It is quick setting and durable, providing a surface resistant to dusting, cracking, and wear, even under factory trucking. It may be used as a low cost leveling mixture for underlayment, under composition, carpets, etc. It is not recommended under extreme acid, oil, or moisture conditions.

The materials may be purchased or the floor finish will be installed complete by the company.

*Registered Trade-Mark

DETAILS of PYROBAR PRECAST 2½ INCH T and G FLOOR and ROOF TILE and PYROBAR PRECAST CEILING TILE



RED TOP* RIB FLOORS

DESCRIPTION

GENERAL—Electrically welded bar trusses (see below), prefired with gypsum at the producing mills are laid directly on the top flanges of the supporting steel, to which they are field welded.

Sheetrock is then laid on the shoulders of the Red Top Ribs and a Sheetrock Pyrofill slab poured in place. The ribs are generally placed 25 in. on center for floors and 33 in. on center for roofs. For floor loads exceeding 150 lbs., the spacing is proportionately reduced.

ADVANTAGES—It will be noted that each rib forms the stem of a Tee Beam in which the Sheetrock Pyrofill is the cross member. The loads are based on the strength of the steel truss members alone so that the Tee construction represents additional strength and stiffness, not considered in the calculations.

It also serves to prevent any lateral sway or tendency of the rib to rotate. The enclosing gypsum makes the slab a rigid whole, effectively tying the entire structure together.

FIREPROOF—This construction is generally acceptable any place where concrete is accepted in building codes and insurance classifications.

It is unnecessary to use concrete for fireproofing as both the supporting steel beams and girders may be fireproofed with Pyrobar beam fireproofing after the

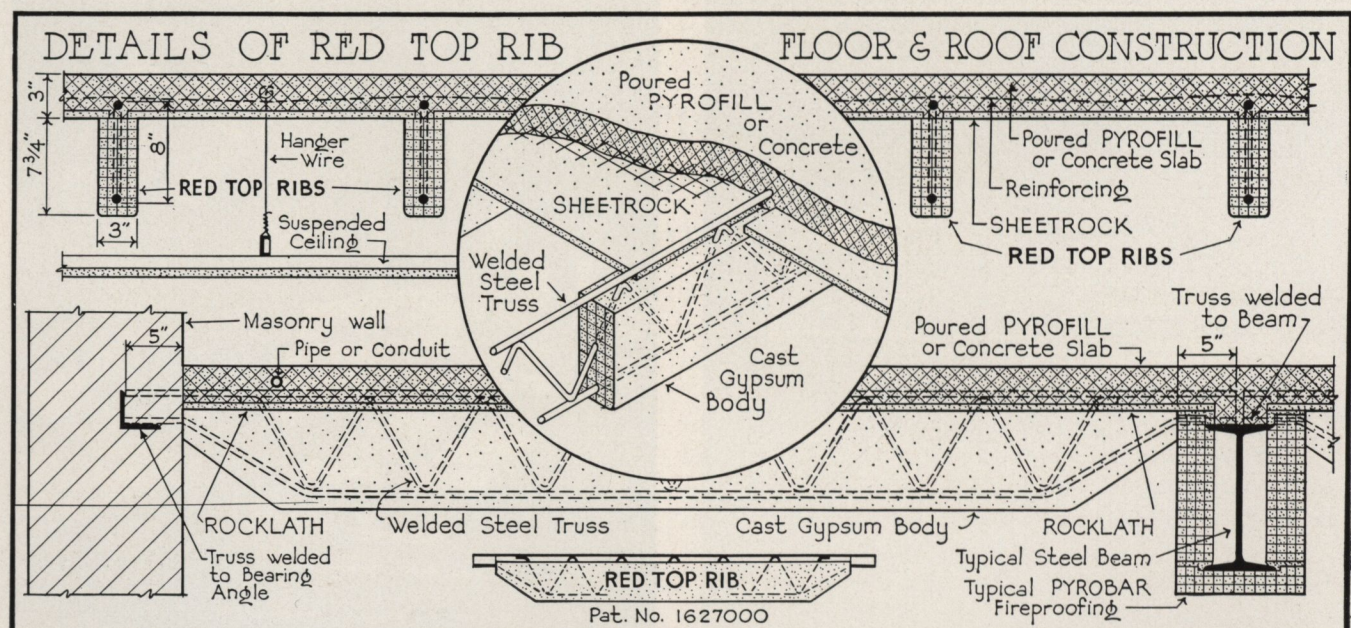
slab is poured, as may the columns, saving additional weight and steel costs.

ECONOMIES—The elimination of all temporary centering, the fireproofing of the ribs, and the construction largely factory built, makes for speedy erection and immediate use of the slabs.

The light weight (less than 20 lbs. per square foot) provides economies in supporting steel from roof to foundation that will generally make this floor construction more economical for any type of fireproof steel building. In tall buildings, useful reductions in footing sizes and costs are possible.

CEILINGS—Where a beam ceiling is desirable, the cast rib and Sheetrock panels are attractive in appearance. Metal lath and plaster ceilings may be attached or suspended in the usual way, in which event the space between the ceiling and the Sheetrock Pyrofill slab may be used for conduits. It is also perfectly possible to embed conduits in the slab itself as they may be readily laid over the ribs and Sheetrock before the Pyrofill is poured, making cinder-fill unnecessary, reducing the total height of the building and making substantial savings in the dead load carried by the supporting steel.

Where this construction has been used, surprising savings in supporting steel and actual slab costs were secured over other structural designs of equal merit in fire protection and strength.



USG STEEL ROOF DECK

DESCRIPTION

GENERAL—

Deck Plates—USG deck plates are rolled from copper-bearing steel. Mill painted in gray. Other materials on special order. USG Deck Plates are 18 in. wide with 1½ in. deep reinforcing ribs, 6 in. on centers. Stiffening beads are formed midway between the ribs. Deck plates are interlocking and end-lapping type, clipped together when erected, forming an integral surface for the application of insulation and roofing materials.

Clips—Two standard types. One for fastening the deck plates to the purlins and the other for locking the plates together between the purlins.

ADAPTABILITY—USG Steel Roof Decks are adaptable for all steel frame structures, fitting any purlin spacing.

ADVANTAGES—

Long Life—The use of copper-bearing steel and insulation assures long life and low maintenance.

Economy—Cost is lowest of any incombustible roof deck.

(1) Structural Steel Savings result from light weight of roof unit.

(2) Fuel Costs are reduced through the use of insulation.

(3) Erection is rapid, due to simplicity of design and method of clipping. Saddles are made from deck plates and are easily placed. These features speed completion of the building and effect economies in construction.

Results—Clean, sanitary and pleasing interior. Year-round comfort for occupants. No condensation to harm material or machinery.

ENGINEERING DATA—The allowable safe loads given in the table below are based on actual tests on bare plates. Application of insulation gives additional rigidity to the deck.

ALLOWABLE SAFE LIVE LOADS—POUNDS PER SQ. FT.										
U.S.S. Ga.	Clear Span									
	4'0"	4'6"	5'0"	5'6"	6'0"	6'6"	7'0"	7'6"	8'0"	8'6"
22	83	66	53	44	37					
20			81	67	56	48	41			
18					71	60	52	45	39	35

Factor of safety for 22 and 20 Gauge—4.
Factor of safety for 18 Gauge—3.5.

Weight of 20 gauge deck is 2.4 lbs. per sq. ft.; 18 gauge weighs 3.2 lbs. Total dead load, including insulation and roofing material, is approximately 5 lbs. per sq. ft.

INSULATION—The accompanying table gives the heat transmission expressed in B.t.u. per hour per sq. ft. per degree difference in temperature. Five-ply roofing is included.

Deck without insulation	.781 B.t.u.'s
Deck with ½-in. insulation	.358 B.t.u.'s
Deck with 1 -in. insulation	.232 B.t.u.'s
Deck with 1½-in. insulation	.172 B.t.u.'s

Master Specifications

USG STEEL ROOF DECK

(1) WORK INCLUDED

NOTE—Here list the various roof areas to be constructed of USG Steel Roof Deck.

(2) MATERIALS

The steel deck shall be manufactured by the United States Gypsum Company from copper-bearing steel and painted light gray after fabrication.

Deck plates shall have reinforcing ribs not more than 6 in. O.C., 1½ in. deep, ½ in. wide at base. Plates shall have stiffening beads formed into the plates midway between the reinforcing ribs. Deck plates shall be U.S.S. No. [specify] gauge.

Clips shall be furnished for securely fastening the deck plates to the purlins, and for interlocking adjoining deck plates together at the ends and midway between the purlins.

(3) ERECTION

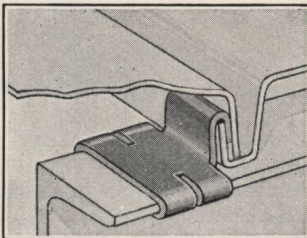
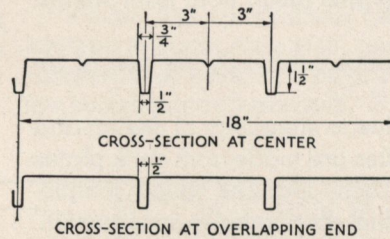
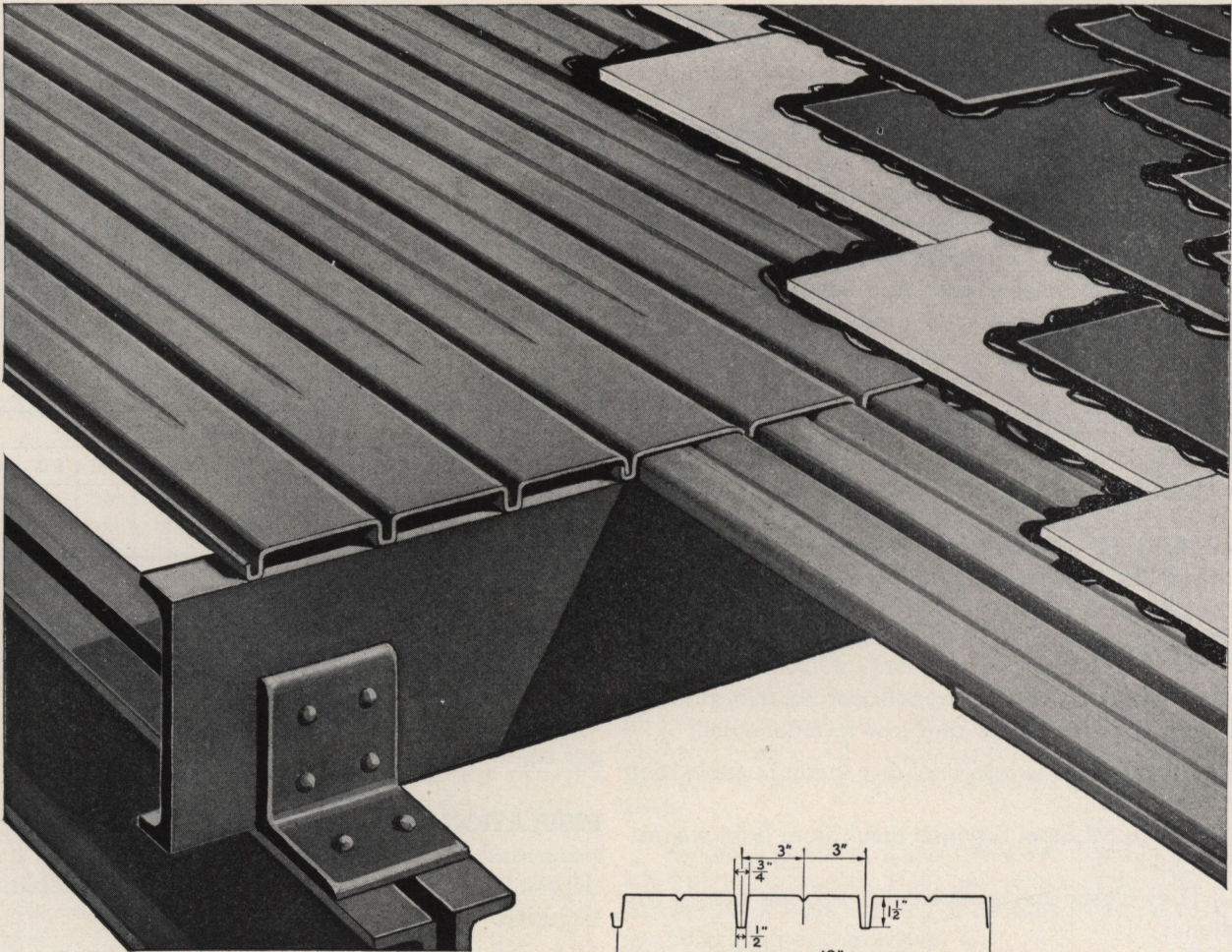
Erection shall be done by an experienced erector, subject to the architect's approval.

All end laps shall be not less than 2 in. in length and shall be made directly over the purlins.

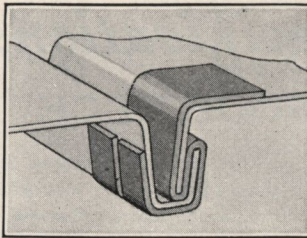
Each plate shall be securely fastened to the purlin by [steel clips engaging the deck rib] [welding].

Each plate shall be securely fastened to the adjoining plate by at least three intermediate clips.

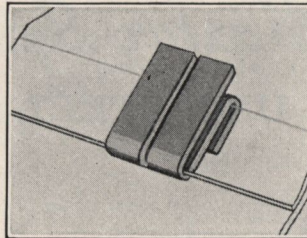
DETAILS of USG STEEL ROOF DECK



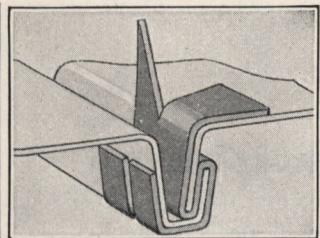
RD-1 PURLIN CLIP for securing deck plates to purlins. Made in two types. On I-Beam purlins, use type "B" clips. On channel purlins and bar joists, use type "C" clips. Made from No. 16 ga. electro galvanized steel.



RD-2 INTERMEDIATE CLIP for interlocking deck plates on flat roofs. Clips are installed at each purlin support and between them on wide spans, and bent to fit as shown above. Made from No. 20 ga. electro galvanized steel.



RD-3 END CLIP. Used on USG Steel Roof Deck plate ends to prevent any possible slippage when installed on pitched roofs. Sufficiently long to permit full two-inch end lap. Made from No. 20 ga. electro galvanized steel.



RD-4 INTERMEDIATE CLIP for use on steep, pitched steel deck roofs. The prong provides a method for securely attaching the insulation. Except for this feature, the clip is identical with RD-2, and is similarly used.

PYROBAR PARTITION and FURRING TILE, COLUMN, BEAM and GIRDER FIREPROOFING

DESCRIPTION

GENERAL—Pyrobar Gypsum Tile consist of 97% gypsum and 3% special wood fiber. They are moulded in steel moulds by continuous automatic machine process, which insures accurate proportions and an even distribution of gypsum, fiber and water, resulting in tile of uniform size, weight, strength and density.

PARTITION AND FURRING TILE—A Pyrobar tile is 30 in. long, 12 in. high and of various thicknesses from 1½ to 6 in. For complete sizes and weights, see table on page 16.

Smooth face tile are made for warehouse and similar use where the furring and partitions are to remain unplastered.

Pyrobar tile meets fully the standard specifications for Gypsum Partition tile or block of the American Society for Testing Materials.

All Pyrobar Gypsum Tile are trade-marked for the protection of owners, architects, engineers and contractors.

COLUMN COVERING—Column fireproofing is accomplished either with 2 in. solid or 3 in. hollow Pyrobar Partition Tile. When desired, or required by a building code, the space between the covering and the steel may be solidly backfilled with pieces of Pyrobar Tile and gypsum mortar.

BEAM AND GIRDER FIREPROOFING—Beam and Girder Fireproofing employs shoe tile, angle tile, soffit tile, and standard Pyrobar partition tile. (See page 17.)

Pyrobar Shoe Tile, which fit over the lower flanges of the steel, in combination with Pyrobar Partition Tile for side protection are used as beam fireproofing for sections with a flange width not over 9 in. They are moulded in a double unit, 18 in. long, sufficient for 18 in. of beam. They are light in weight, easily split, and placed with a minimum quantity of mortar and labor. The double unit reduces breakage during shipment and handling.

For rolled sections and built-up members with flange widths of 3 in. to 17 in. Pyrobar soffit tile may be used in combination with Pyrobar partition tile for a side covering. The soffit tile are channel shaped to protect the bottom and also the edges of the lower flange. They are specially moulded at the mill in 13 standard widths and in standard 36 in. lengths. For jobs of appreciable size, special soffit tile of the same type will be manufactured to fit any built-up member.

These constructions provide a full two inches of protection to all parts of the steel, and fulfill the require-

ments of the National Board of Fire Underwriters.

SET FAST* CEMENT—This is a specially prepared gypsum cement used with water and sand as a mortar for setting gypsum partition tile, and gypsum fireproofing and column covering. It is also extensively used as a mortar for interior clay tile partitions and fireproofing. Its easy working qualities together with the early strength of the gypsum makes Set Fast Cement Mortar ideal for economical rigid mortar joints in all interior tile work.

APPROVED USES—In the following classes of fireproof construction, Pyrobar Precast Gypsum Tile are approved by the Underwriters' Laboratories, Inc., and most city building codes.

Non-bearing corridor walls, partitions, wall furring and false columns and pilasters. Partitions and corridors in merchandise storage warehouses.

Fire division walls.

Elevator, stairway, dumbwaiter and corridor enclosures.

Light wells, pipe chases, heat and vent ducts.

As covering for columns, beams, girders, trusses and other steel members requiring fireproofing.

Floor fill, instead of cinder concrete fill.

Fireproof insulation on concrete roofs.

RECOMMENDED THICKNESS—PARTITION AND FURRING TILE—Pyrobar Gypsum Tile for furring and partitions are made in standard face dimensions (12 x 30 in.) in both solid and hollow types, and various thicknesses to meet Underwriters' standards and the building codes of the various cities. For table of sizes and weights, see page 16.

The thickness of the partition should be determined primarily by the ceiling height and by its location. As a rule 3 or 4-in. tile is the thickness used for the average building where partitions do not exceed 15 ft. in height. Corridor partitions are generally thicker than transverse partitions.

Two-inch solid Pyrobar Tile are used for partitions not exceeding 10 ft. in height and for covering columns, constructing pipe chases, vent ducts, dumbwaiter shafts, etc.

Split and hollow Pyrobar Furring are laid up against exterior walls and securely spiked every square yard. Joints should be broken the same as for partition work. Furring may also be fastened to the building wall by means of wall ties built into the masonry. The hollow portion of the tile should be placed against the walls, thus minimizing the contact area with the outside walls.

*Trade-Mark

Where furring stands free from the wall, allowing space for pipes, vents, etc., it is customary to use 2-in. solid or 3 or 4-in. hollow Pyrobar Tile to assure necessary rigidity.

Free standing furring should be anchored to the exterior wall either by dwarf walls between the furring

and exterior wall, or by building into the exterior wall corrugated metal wall ties of sufficient length to span the space and be embedded in the furring tile joints.

ERECTION SERVICE—Where desired, Pyrobar Tile are completely erected by the USG Engineering Sales Division.

ADVANTAGES

NOTE—See "Why Gypsum - General Technical Data," page 1, and particularly the "Summary of Gypsum Advantages," page 2.

FIREPROOF—Gypsum Tile alone have successfully passed the Underwriters' requirements for fireproof partitions.

LIGHT WEIGHT—See pages 1 and 2.

IDEAL PLASTER BASE—See page 2.

EASILY AND CHEAPLY ERECTED—The large, uniform units are much easier and therefore cheaper to erect than other masonry partition units.

PLASTER SAVINGS—Pyrobar Tile are cast in steel moulds assuring a product with straight edges and true faces. This insures a perfectly even, true wall which takes a minimum amount of plaster.

Experience shows that plastering over Pyrobar Tile requires only 80% as much plaster as over clay tile.

ECONOMICAL—Breakage is almost negligible. Cutting around openings and pipes does not cause waste as all the pieces can be used, whereas with clay tile a full tile is usually wasted in cutting even a small piece.

Ordinarily from 5 to 7% less Pyrobar Tile is required for a job than clay tile.

ALTERATIONS—Alterations in the partitions after completion of the building are easily made. Additional openings in Pyrobar walls may be cut with a saw, thus saving replastering, patching debris, and time.

GROUNDS—Grounds for plastering are nailed directly to the tile. Nailing blocks may be spiked to the tile ends for the support of wood trim, blackboards, etc. Heavy fixtures may be supported by bolting through the walls using large metal washers on the bolts.

SPECIAL SHAPES—Pyrobar Tile are made in special shapes and sizes to fit all conditions.

WEIGHT OF FIREPROOFING PER LIN. FT. OF BEAM IN LB.

Size member	Precast Gypsum	Clay Tile	Concrete
6 in. I	19	33	60
7 in. I	21	36	71
8 in. I	23	39	93
9 in. I	25	43	95
10 in. I	27	47	118
12 in. I	30	51	131
15 in. I	35	60	168
18 in. I	42	68	208
20 in. I	44	73	234
21 in. I	48	79	293
24 in. I	52	85	297

SIZES AND WEIGHTS OF PYROBAR PARTITION AND FURRING TILE

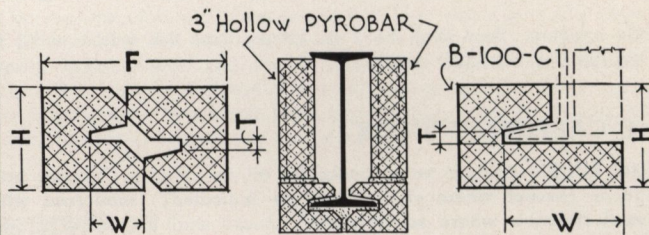
Size of Pyrobar, Gypsum Tile, in.	Recom- mended heights for each size	Weight tile per sq. ft., lb.	Weight mortar per sq. ft., lb.	Weight plaster, one side, per sq. ft., lb. ½ in. grounds	Total weight plastered, one side, per sq. ft., lb.	Weight plaster two sides per sq. ft., lb.	Total weight plastered, two sides, per sq. ft., lb.
1½-in. Split.....1½ x 12 x 30	Furring†	4.9	1.4	3	7.9		
2-in. Split.....2 x 12 x 30	Furring†	6.4	1.4	3	9.4		
2-in. Solid.....2 x 12 x 30	10 feet*	9.4	1.5	3	12.4	6	15.4
3-in. Hollow.....3 x 12 x 30	13 feet*	9.9	2.0	3	12.9	6	15.9
3-in. Solid.....3 x 12 x 30	15 feet†	13.0	2.0	3	16.0	6	19.0
4-in. Hollow.....4 x 12 x 30	17 feet*	13.0	2.5	3	16.0	6	19.0
5-in. Hollow.....5 x 12 x 30	20 feet*	15.6	2.75	3	18.6	6	21.6
6-in. Hollow.....6 x 12 x 30	30 feet*	16.6	3.0	3	19.6	6	22.6

*Underwriters' Laboratories recommendations.

†No Underwriters' recommendation.

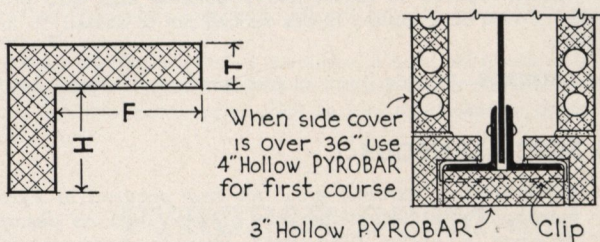
PYROBAR BEAM and GIRDER FIREPROOFING **WEIGHTS of SHOE TILE, ANGLE TILE and SOFFIT TILE** **PER LINEAL FOOT OF BEAM**

PYROBAR SHOE TILE



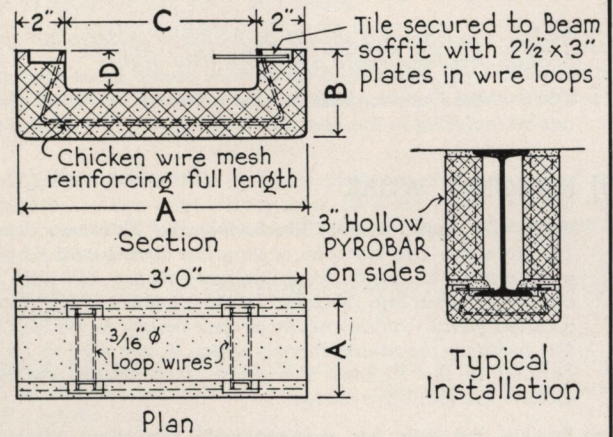
TYPE	MAX. WIDTH OF FLANGE	F	H	T	W	WEIGHT PER LIN. FT.
B-40	5"	7 ⁵ / ₈ "	4 ¹ / ₄ "	1/2"	2"	12.5 lbs.
B-50	6"	8 ¹ / ₄ "	4 ¹ / ₄ "	5/8"	2 ¹ / ₂ "	13
B-65	7 ¹ / ₂ "	9 ³ / ₄ "	4 ¹ / ₄ "	13/16"	3 ¹ / ₄ "	15
B-80	9"	10 ¹ / ₂ "	4 ¹ / ₄ "	15/16"	4"	16
B-100-C	Channels		4 ¹ / ₂ "	1/2"	4 ⁷ / ₈ "	15

PYROBAR ANGLE TILE

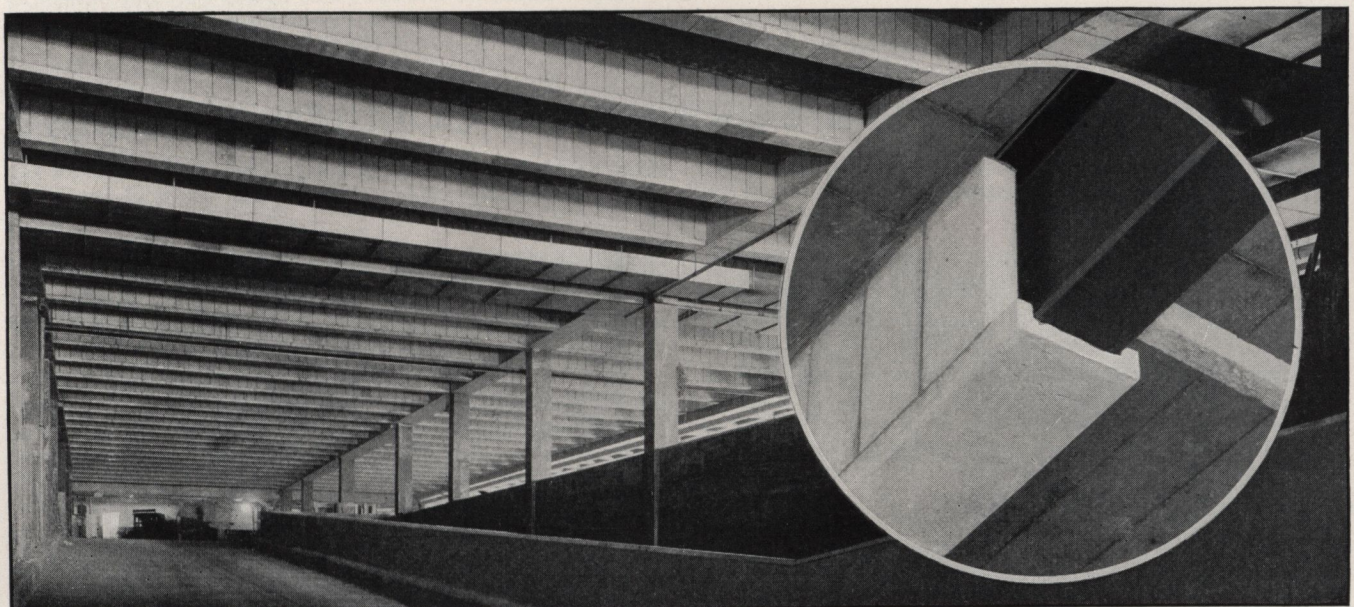


TYPE	F	H	T	WEIGHT PER LIN. FT.
L-34	3"	4"	2"	15 lbs.
L-45	4"	5"	2"	18.5
L-46	4"	6"	2"	20

PYROBAR SOFFIT TILE



TYPE	A	B	C	D	WEIGHT PER LIN. FT.	MAX. WIDTH OF FLANGE
B-30-S	7 ¹ / ₄ "	3"	3 ¹ / ₄ "	1"	8 lbs.	3"
B-40-S	8 ¹ / ₄ "	3 ¹ / ₄ "	4 ¹ / ₄ "	1 ¹ / ₄ "	9	4"
B-50-S	9 ¹ / ₄ "	3 ¹ / ₄ "	5 ¹ / ₄ "	1 ¹ / ₄ "	10	5"
B-60-S	10 ¹ / ₄ "	3 ¹ / ₄ "	6 ¹ / ₄ "	1 ¹ / ₄ "	11	6"
B-70-S	11 ¹ / ₄ "	3 ¹ / ₂ "	7 ¹ / ₄ "	1 ¹ / ₂ "	12	7"
B-80-S	12 ¹ / ₄ "	3 ¹ / ₂ "	8 ¹ / ₄ "	1 ¹ / ₂ "	13	8"
B-90-S	13 ¹ / ₄ "	3 ¹ / ₂ "	9 ¹ / ₄ "	1 ¹ / ₂ "	14	9"
B-100-S	14 ¹ / ₄ "	3 ³ / ₄ "	10 ¹ / ₄ "	1 ³ / ₄ "	15	10"
B-115-S	15 ³ / ₄ "	3 ³ / ₄ "	11 ³ / ₄ "	1 ³ / ₄ "	16	11 ¹ / ₂ "
B-130-S	17 ¹ / ₄ "	3 ³ / ₄ "	13 ¹ / ₄ "	1 ³ / ₄ "	17 ¹ / ₂	13"
B-145-S	18 ³ / ₄ "	4"	14 ³ / ₄ "	2"	19	14 ¹ / ₂ "
B-160-S	20 ¹ / ₄ "	4"	16 ¹ / ₄ "	2"	20 ¹ / ₂	16"
B-175-S	21 ³ / ₄ "	4"	17 ³ / ₄ "	2"	22	17 ¹ / ₂ "



Pyrobar Beam and Girder Fireproofing Used in New Chicago Post Office—Graham, Anderson, Probst and White, Architects

Master Specifications

CORRELATIVE PROVISIONS

(Applying to Pyrobar Partitions, Furring and Column Covering)

NOTE—The following should be included under other specification divisions where and when they apply.

NOTE—Notes are explanatory or advisory only and should not be included in the specifications.

(1) MASONRY WORK

NOTE—As stated under "Recommended Thickness," page 15, there are two methods of securing furring and the ends of partitions to the building masonry walls: (1) with 10d cut nails driven into the joints of the masonry, (2) with corrugated metal wall ties of the proper length to be built into the masonry, spanning furring space if any and to be embedded in the Pyrobar Tile joints. If method (2) is used, include the following clause:

(1a) Provide and build into masonry walls corrugated galvanized sheet iron ties to anchor the [ends of Pyrobar partitions] [and] [Pyrobar Wall Furring] to the masonry work.

(1b) Ties for partition ends shall be accurately set and spaced 12 in. apart o.c. to build into the Pyrobar Tile joints.

(1c) Ties for furring, one for each surface, sq. yd., shall be accurately set to build into the Pyrobar Tile joints.

(2) MISCELLANEOUS STEEL WORK

(2a) All openings in Pyrobar partitions so noted on plans or schedules shall be provided with (channel bucks) (channels reinforcing wood bucks).

(2b) The lintel bucks of all openings in Pyrobar partitions over 6 ft. wide shall be reinforced with steel lintels as [noted on plans or schedules] [as detailed].

(3) REINFORCING BARS

All openings in Pyrobar partitions over 4 ft. wide but not over 6 ft. wide shall be provided with ½ in. steel reinforcing bars, 3 to

the opening. Bars shall be 8 in. longer than the actual width of tile opening (not buck width).

(4) CARPENTRY WORK

(4a) **BUCKS**—Provide wood bucks for all openings in Pyrobar partitions [except where steel bucks are indicated] [reinforced with steel channels where so indicated]. Bucks shall be made of 2-in. lumber the depth of the Pyrobar Tile thickness, to the edges of which shall be secured ½ x 2¾ in. plaster grounds forming a rabbet to receive the tile. Bucks shall be accurately set, plumb and true and rigidly braced, so as to cause no delay or interruption in the erection of the partitions.

(4b) **NAILING BLOCKS**—Provide and nail directly to the end of Pyrobar [partition] [and] [furring] tile nailing blocks spaced 30 in. on centers to take all wood grounds to receive trim. Blocks shall be ¾ in. thick and of such dimensions as will completely cover the end of the tile.

Where required to secure heavy fixtures, trim, etc., provide similar 1½-in. thick nailing blocks spaced not to exceed 15 in. on centers.

(4c) **GROUND**S—Provide ½-in. plaster grounds to receive all trim.

(5) MISCELLANEOUS

NOTE—Heavy fixtures, etc., are best secured to Pyrobar partitions with steel plates and through bolts as described on page 16 (under "Grounds"). Provide where required.

(6) PLASTERING

NOTE—For Plastering on Pyrobar, see Sweet's File Index for USG "Master Specifications—Interior Lathing and Plastering." Under no circumstances should Portland cement or lime plaster be used for the first coat—use only gypsum plaster.

PYROBAR, PARTITIONS, FURRING and COLUMN COVERING

NOTE—Notes are explanatory or advisory only and should not be included in the specifications.

(1) WORK INCLUDED

All partitions [and] [all furring for exterior masonry walls] [and] [all column covering] shall be built of Precast Pyrobar Gypsum Tile.

NOTE—If there are any exceptions, so note. List and locate any special requirements not clearly indicated on plans and details. Particularly list and locate where smooth face tile are to be installed requiring no plaster finish.

(2) PRELIMINARY PROVISIONS

(2a) All reinforcing bars for reinforced lintels will be furnished by others.

(2b) All rough bucks for openings will be provided and accurately set by others.

(2c) All wood nailing blocks to receive grounds, etc., will be provided and attached to tile by others.

(3) MATERIALS

(3a) **GENERAL**—All gypsum tile and cement shall be as manufactured by the United States Gypsum Company.

(3b) **PARTITION TILE**—Pyrobar of thicknesses indicated on plans. [Pipe chases] [small shafts] [heat] [and] [vent] [ducts] etc. shall be constructed preferably with 3-in. Hollow Pyrobar, otherwise of 2-in. solid Pyrobar.

Where no plastering is required, tile shall be smooth face.

(3c) **FURRING TILE**—Pyrobar [split] [solid] [specify thickness]. Where no plastering is required, tile shall be smooth face.

(3d) **COLUMN COVERING**—Pyrobar [2-in. solid] [3-in. hollow].

(3e) MORTAR—Sand for mortar shall be clean and sharp and free from organic matter.

Cement for mortar shall be Setafast Gypsum Cement.

NOTE—Do not use Portland cement or lime.

Mortar shall be mixed in a clean mortar box in the proportions of one part of cement to three parts of sand, by weight, and sufficient clean water to bring to the right consistency. First place a layer of sand in the high end of the mortar box, over which spread a layer of cement. Hoe dry from one end of the box to the other and back again, working sand and cement thoroughly together to a uniform color. Put water in low end of box and hoe mortar into water, mixing thoroughly. Do not mix more material than can be applied in approximately one hour. Do not retemper.

(4) ERECTION

(4a) BY USG CO.—All Pyrobar [partitions] [and] [furring] [and] [column-covering] shall be completely erected by the United States Gypsum Company's Engineering Sales Division.

(4b) GENERAL—All tile shall be laid in gypsum mortar with full, flush joints to a line, with horizontal beds uniformly level on each course. All joints, chinks and crevices between the tile and other work shall be filled with mortar well slushed in. Joints in alternate courses shall be broken.

All joints of smooth tile (unplastered) shall be neatly pointed smooth as the work progresses. Fill all exposed core openings at corners, etc.

All tile shall be started on the fireproof floor, set plumb straight and true, and wedged at ceiling and slushed with mortar. Tile at corners and re-entrant angles shall be laid interlocked in alternate courses.

(4c) PARTITIONS—All partitions coming in contact with existing wall shall be rigidly anchored, [by driving 10d spikes into the mortar joints of the wall at the joints of each partition tile course] [by building in at each partition tile course metal ties provided and built into the masonry by others].

(4d) FURRING—Furring shall be laid [against] [or] [free from] the walls as shown on the plans and details.

Rigidly anchor the furring tile to the masonry wall every square yard of the face area [by 10d spikes driven into the mortar joints of the wall at the course joints of the furring tile] [by building in at the furring tile course metal ties provided and built into the masonry by others].

(4e) COLUMN COVERING—A single thickness of tile shall be laid against the outside edges of the steel [and the space between the tile and steel shall be solidly backfilled with pieces of Pyrobar tile and gypsum mortar].

NOTE—Include or omit clause covering backfilling as required.

(4f) BUCK ANCHORS—Anchor all wood bucks to tile by 10d cut nails driven into the buck at each tile course or other approved metal anchor.

(4g) LINTELS—Lintels shall have at least 4-in. bearing at each end on the tile beneath. Openings not over 22 in. wide shall be spanned by a single tile. Lintels over openings more than 22 in. and not over 4 ft. wide shall be laid in the form of a jack-arch. Lintels over openings more than 4 ft. and not over 6 ft. wide shall be reinforced with steel rods set in the tile voids flushed full with mortar. Lintels over openings more than 6 ft. wide shall be provided with steel lintel furnished by others.

PYROBAR BEAM and GIRDER FIREPROOFING

NOTE—Notes are explanatory or advisory only and should not be included in the specifications.

(1) WORK INCLUDED

All steel [beams] [girders] [trusses] shall be protected with precast gypsum fireproofing.

NOTE—List and locate any special requirements not clearly indicated on plans and details. Note exceptions if any.

(2) MATERIALS

(2a) FIREPROOFING—All fireproofing shall be Pyrobar Beam Shoe, Angle and Soffit Tile, and Pyrobar (2 in. solid) (3 in. hollow) Parti-

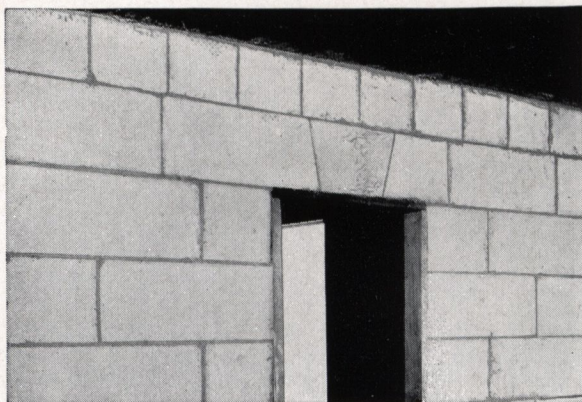
tion Tile as made by the United States Gypsum Company. All steel shall be protected with a minimum of 2 in. of precast gypsum.

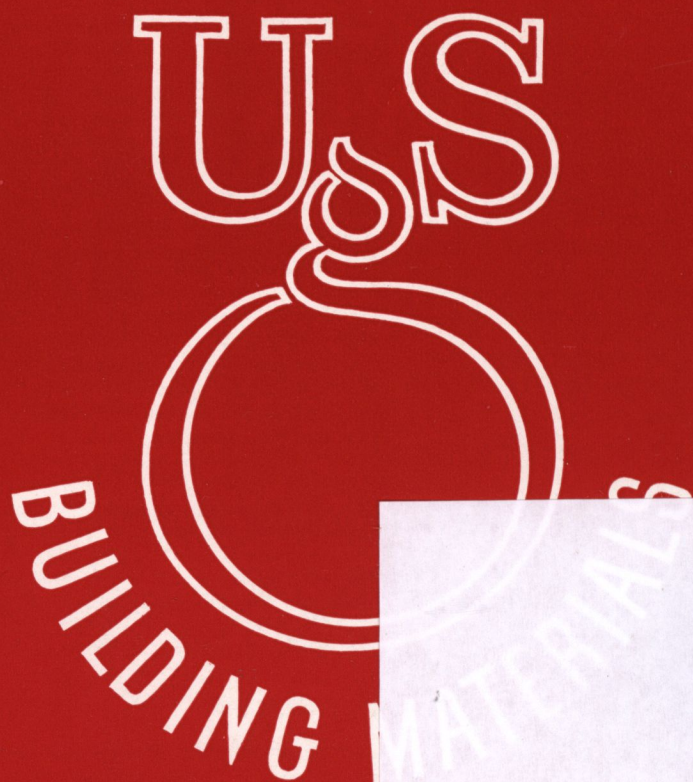
(2b) MORTAR—NOTE—Same as "(3e) Mortar" above.

(3) ERECTION

(3a) BY UNITED STATES GYPSUM COMPANY—All fireproofing shall be completely erected by the United States Gypsum Company's Engineering Sales Division.

(3b) GENERAL—All fireproofing shall be erected in strict accordance with the United States Gypsum Company's standard details. All units shall be laid in gypsum mortar with full flush joints, true to line and plumb. Joints in alternate courses shall be broken.





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